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I. *Part of a Letter from Mr. Leuwenhook, Dated Delft 23d. of June, 1699. Concerning his Answers to Objections made to his Opinions concerning the Animalcula femine Masculine.*

I Have seen in the *Philosophical Transaction*, Numb. 247 fol. 337. The Objections, propos'd by way of Questions, which the very learned Dr. Martin-Lifter maketh, against many positions, concerning the Procreation of an Animal out of the Masculine Seed.

Concerning this, I must tell you, that these Objections do not at all alter my Opinion.

We see almost always that provident Nature, doth, concerning the encreasing or Procreation, be it in Animals, Fish, or other things, almost go every where the same way to Work. For we have as little Reason as we have to ask, how out of the Seed of a Tree, let us take an Apple-tree, which Seed we know to be a Kernel, of an Apple, can not only come to grow a whole Tree, but also in a few Years time, can be Multiplied into a thousand Trees. All the Trees, that we find on the Globe of the Earth, Originally are come, and do proceed, from Seed of the Trees, that were at first Created on our Globe.

Now we come to see, in the Seed of an Apple, the Leaves although they are very much less, then the Leaves of other Seeds of Trees, but according to the smallness of the Leaves proportionably, seems to us in the Pith of a Seed of an Apple-tree, much bigger than part, that shall make the stem of the Tree, and in this we see the Pith of the Tree, and a great many Vessels, part whereof did carry up the Juices and the Bark; but, I believe, that we shall never penetrate into these Mysteries, that in the Plant of the Seed of an Apple which we endeavour to Anatomize, we should be able to discover, the Tree with its boughs, much less the Blossoms and Apples; and although such an Investigation, shall remain hid from our Eyes, yet notwithstanding daily Experience doth teach us, that out of a Seed of an Apple, is produc'd a young Plant; which Plant in process of time, after the expiration of some years, is not only grown up into a Tree, but it also doth Bear Apples; Now certainly the whole Tree and Fruit was locked up in one Seed of an Apple, for if it had not been locked up in the Seed, how could (according to my supposition) possibly the Tree and Fruit Sprout out of it.

Must not we stand amazed, when we consider, the encreasing and procreation, of so many sorts of Fish that have Rows, and whose Masculine Seed is the Soft Row, viz. that out of one Soft Row, to Wit the Cods, proceed so many Millions of small Animals every year, and that at that time when the Cod has shot his Soft Row, the Rows thereof shrink up, or the twisted parts of these Soft Rows shrink up so close together, that they only seem to be Skins or Membranes; and we see that some Weeks after, the Soft-row doth encrease

crease again from time to time and accordingly the twisted parts of the Row, doth grow full again, with Masculine Seed, that so at the striking time, they are so Lively, or are so much enlivened that we have often times seen them swim forth, in this Moisture that containeth them.

This being so, we must certainly assert it as a truth, that when a Cod hath shot his Masculine Seed, there doth still remain in his Soft Rows, a great deal of Seeding Matter, where out more Seedly Animals are produced, then were shot out of it the Year before, by Reason as Fishes grow bigger from Year to Year, so doth also their Soft Rows encrease in bulk.

Now that these Animals should come or proceed from themselves, seems to me not to be apprehended, for if they should come from, or out of themselves, I imagine that then they could not all be endued with one and the same quality as now they are.

For we find not the Masculine Seed of a Cod, doth, intermix with the Female Eggs of other Fish, although they strike at the same time. We have only observed that the Fishes which we call *Soals* and *Schars*, intermix their Shot Seeds (yet very seldom) with one another, from whence comes a Fish, that is neither *Schar* nor *Soal*, and therefore the Fisher give him the name of *Scharre-soale*.

Now are also the Fishes, as many sorts as are found, not of themselves, but Originally come from the first Seeds, and that from the same, that were Created from the beginning.

Now if we know which way the Fish do increase, that it is not done but by intermixing of the Male and Female Seeds, and likewise we do know the great Mystery that is included in the small Seed of an Apple, why might not we then assert, that in an Animal of the Masculine Seed of a Man, is locked up a whole Man, and that the Animals of the Seed, are all descending from the first Created Man.

We know, that the Testicles are chiefly consisting of a very thin and long Vessel, that doth lay in a multitude of turnings and windings, and that we have pulled out near the end of it some Living Creatures.

Now if we imagine, that through this long and thin Vessel, the Matter of the Masculine Seed, wherewith this long vessel is filled up, is from time to time carryed very slowly further, to fill up the places again, of these Animals that in and about the Copulation were carried off; and who doth know, but these Animals have left behind them some Seminal Matter, from whence their Species can be Propagated, and that without Copulation, as we have Observed, that small Animals, that were not near come to perfection bring forth their Kind without Copulation, are encreased in bigness, and afterwards changed into Flying Creatures.

It will seem strange to many, that cannot comprehend, how in an Animal of the Masculine Seed, that is so incomprehensively small, so great a Secret, as a Body of a Man doth comprehend, can be Locked up. But if we remember that there are Living Creatures in Waters, that we have many times seen come before our Eyes, that being of a Roundish Body, were no thicker then the thinnest end of a Tayl of an Animal in the Masculine Seed.

And we have also at the same time judged, that a thousand Millions of these Animals together, could make up no bigger a Body then a single Corn of a Course.

Course Sand, (as I have said heretofore) and if we then also consider, of how many pieces and Instruments the Body of such an Animal doth consist, wherewith it moveth it self from place to place, and also farther consider, what great Wonders can be lodged in such an Animal, we must stand amazed, and cannot apprehend, the extraordinary smallness of these Parts, whereof these Creatures are composed, and say within our selves, how impervestigable is the depth of Wisdom.

It being then that hitherto, nothing at all is come before me that can make me the least Scruple, to induce me to recede from my former opinion, and to receive an opinion to believe, or hold, that Animals should come forth of themselves, therefore I still remain of this my opinion, that out of the Animals of Masculine Seeds, come forth Animals of the same kind as they were Created in the beginning, and that as hitherto no truer Position is left. For if Animals could be born of themselves, which I should reckon to be a Miracle, then must not only every Minute, but every Second, Millions of Miracles be done, which is an opinion not to be received, for if this was so, there must daily new Creatures be brought forth, which hitherto we have not observed.

Now if we add hereunto, as I have Judged it to be formerly, that in the Animals of the Masculine Seed, there was a small difference, from each other, from whence I conclude the one sort to be Males the other Females, and if this takes place in all Masculine Seeds, I cannot see, why we have not a hundred times more Reason to believe, that the Animals in the Masculine Seed, when they are grown to perfection, are provided with Matter fit for Seed, wherewith to propagate their Kind, then that we should Forge in our Brains, that Animals come from themselves.

I know no Animal (small Insects only excepted) that is subject to so many changes as a Frog, for out of the Egg, comes forth an Animal, that is more like unto a Worm, then unto a Frog, and as it could in the beginning nothing else, but swim a long by the moving of its Tail, and beating of it from side to side, it doth Swim (after it is come to be a Frog) by pulling in and thrusting out of its Four Legs, and it runs and jumps upon the Land, where it also gets its Food.

Now as the change of the Animals in the Masculine Seed cannot be investigated by the Eye, as we can do in other things, so we have the Liberty to communicate to others our reasonable thoughts, so as after a most notable consideration they may be Framed in our Brains, so that every one may think his pleasure.

My intention is, shortly to communicate to you some of my Observations, concerning the Motion and Stagnation of the Blood in the Tail of a Frog, in the mean while I remain, &c.